

**INTERNATIONAL APPLICATION
UNDER THE
PATENT COOPERATION TREATY
REQUEST**

**THE UNDERSIGNED REQUESTS THAT THE PRESENT
INTERNATIONAL APPLICATION BE PROCESSED
ACCORDING TO THE PATENT COOPERATION TREATY**

(The following is to be filled in by the receiving Office)

**INTERNATIONAL
APPLICATION No:** PCT/91/00628

**INTERNATIONAL
FILING DATE:** 22 - 04 - 91
22 April 1991

(Stamp) United Kingdom
PCT International Application

**Applicant's or Agent's File Reference
(Indicated by applicant if desired)** JD/MAW/5096

Box No. I TITLE OF INVENTION "IMPROVEMENTS RELATING TO THE LINING OF
PIPELINES OR PASSAGEWAYS"

**Box No. II APPLICANT (WHETHER OR NOT ALSO INVENTOR); DESIGNATED STATES FOR WHICH HE/SHE/IT IS
APPLICANT.** Use this box for indicating the applicant or, if there are several applicants, one of them. If more than one person (includes, where
applicable, a legal entity) is involved, continue in Box No. III.

The person identified in this box is (check one only): ☐ applicant and inventor* ☒ applicant only

Name and address:**

INSITUFORM GROUP LIMITED
3/4 Hill Street,
Douglas,
Isle of Man

Telephone number
(including area code)

Telegraphic address:

Teleprinter address:

Country of nationality:

UNITED KINGDOM

Country of residence:*** UNITED KINGDOM

The person identified in this box is applicant for the purposes of (check one only):

☐ all designated States ☒ all designated States except
the United States of America ☐ the United States
of America only ☐ the States indicated
in the "Supplemental Box"

**Box No. III FURTHER APPLICANTS, IF ANY; (FURTHER) INVENTORS, IF ANY; DESIGNATED STATES FOR
WHICH THEY ARE APPLICANTS (IF APPLICABLE).** A separate sub-box has to be filled in in respect of each person (includes, where
applicable, a legal entity). If the following two sub-boxes are insufficient, continue in the "Supplemental Box," (giving there for each addi-
tional person the same indications as those requested in the following two sub-boxes) or by using a "continuation sheet."

The person identified in this sub-box is (check one only): ☒ applicant and inventor* ☐ applicant only ☐ inventor only*

Name and address:**

ERIC WOOD
Witch's Mill,
Arbory Road,
Castletown,
ISLE OF MAN

If the person identified in this sub-box is applicant (or applicant and inventor), indicate also:

Country of nationality: UNITED KINGDOM Country of residence:*** UNITED KINGDOM

and whether that person is applicant for the purposes of (check one only):

☐ all designated States ☐ all designated States except
the United States of America ☒ the United States
of America only ☐ the States indicated
in the "Supplemental Box"

The person identified in this sub-box is (check one only): ☐ applicant and inventor* ☐ applicant only ☐ inventor only*

Name and address:**

If the person identified in this sub-box is applicant (or applicant and inventor), indicate also:

Country of nationality: Country of residence:***

and whether that person is applicant for the purposes of (check one only):

☐ all designated States ☐ all designated States except
the United States of America ☐ the United States
of America only ☐ the States indicated
in the "Supplemental Box"

* If the person indicated as "applicant and inventor" or as "inventor only" is not an inventor for the purposes of all the designated States,
give the necessary indications in the "Supplemental box."

** Indicate the name of a natural person by giving his/her family name first followed by the given name(s). Indicate the name of a legal entity by
its full official designation. In the address, include both the postal code (if any) and the country (name).

*** If residence is not indicated, it will be assumed that the country of residence is the same as the country indicated in the address.

Box No. IV AGENT (IF ANY) OR COMMON REPRESENTATIVE (IF ANY); ADDRESS FOR NOTIFICATIONS (IN CERTAIN CASES). A common representative may be appointed only if there are several applicants and if no agent is or has been appointed; the common representative must be one of the applicants.
The following person (includes, where applicable, a legal entity) is hereby/has been appointed as agent or common representative to act on behalf of the applicant(s) before the competent International Authorities:

Name and address, including postal code and country:

If the space below is used instead for an address for notifications, mark here ☐

☒ Denmark, JAMES
Bailey Walsh & Co.,
5 York Place,
Leeds LS1 2SD, GB.

Telephone number: 0532-433824
(including area code)

Telegraphic address:

INVENTIONS
LEEDS I

Telexprinter address:

557830 WALPATG

Box No. V DESIGNATION OF GROUPS OF STATES OR STATES (1); CHOICE OF CERTAIN KINDS OF PROTECTION OR TREATMENT. The following designations are hereby made (please mark the applicable check-boxes):

Regional Patent

☒ EP European Patent(2): AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, DE Germany (Federal Republic of), DK Denmark, ES Spain, FR France, GB United Kingdom, IT Italy, LU Luxembourg, NL Netherlands, SE Sweden,
and any other State which is a Contracting State of the European Patent Convention and of the PCT

☐ OA OAPI Patent: Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Gabon, Mali, Mauritania, Senegal, Togo,
and any other State which is a Contracting State of OAPI and of the PCT; if other OAPI title desired, specify on dotted line(3):

National Patent (if other kind of protection or treatment desired, specify on dotted line(3))

☐ AT Austria(3)
☒ AU Australia(3)
☐ BB Barbados
☐ BG Bulgaria(3)
☐ BR Brazil(3)
☒ CA Canada
☐ CH and LI Switzerland and Liechtenstein
☐ DE Germany (Federal Republic of)(3)
.....
☐ DK Denmark
☐ ES Spain(3)
☒ FI Finland
☐ GB United Kingdom
☒ HU Hungary
☒ JP Japan(3)
☐ KP Democratic People's Republic of Korea(3)

☒ KR Republic of Korea(3)
☐ LK Sri Lanka
☐ LU Luxembourg(3)
☐ MC Monaco(3)
☐ MG Madagascar
☐ MW Malawi(3)
☐ NL Netherlands
☒ NO Norway
☐ RO Romania
☐ SD Sudan
☐ SE Sweden
☒ SU Soviet Union(3)
.....
☒ US United States of America(3)

Space reserved for designating States (for the purposes of a national patent) which have become party to the PCT after the issuance of this sheet:

- (1) The applicant's choice of the order of designations may be indicated by marking the check-boxes with sequential arabic numerals (see also the "Notes to Box No. V").
(2) The selection of particular States for a European patent can be made upon entering the national (regional) phase before the European Patent Office (see also the "Notes to Box No. V").
(3) If another kind of protection or a title of addition or, in the United States of America, treatment as a continuation or a continuation-in-part is desired, specify according to the instructions given in the "Notes to Box No. V."

Box No. VI PRIORITY CLAIM (IF ANY). The priority of the following earlier application(s) is hereby claimed:

Country (country in which it was filed if national application; one of the countries for which it was filed if regional or international application)	Filing Date (day, month, year)	Application No.	Office of Filing (fill in only if the earlier application is an international application or a regional application)
(1) <i>United Kingdom</i>	(23. 04. 90) 23 . 4. 1990	9009073.9	
(2)			
(3)			

(Letter codes may be used to indicate country and/or Office of filing)

When the earlier application was filed with the Office which, for the purposes of the present international application, is the receiving Office, the applicant may, *against payment of the required fee*, ask the following:
☐ the receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the above-mentioned earlier application/of the earlier applications identified above by the numbers (insert the applicable numbers)

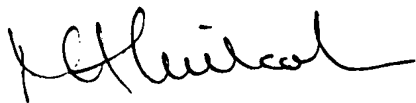
Box No. VII EARLIER SEARCH (IF ANY). Fill in where a search (international, international-type or other) by the International Searching Authority has already been requested (or completed) and the said Authority is now requested to base the international search, to the extent possible, on the results of the said earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request.

International application number or number and country (or regional Office) of other application:

International/regional/national filing date

Date of request for search:

Number (if available) given to search request:

Box No. VIII SIGNATURE OF APPLICANT(S) OR AGENT


M. A. Willcocks
Attorney - INSITUFORM GROUP LIMITED

If the present Request form is signed on behalf of any applicant by an agent, a separate power of attorney appointing the agent and signed by the applicant is required. If in such case it is desired to make use of a general power of attorney (deposited with the receiving Office), a copy thereof must be attached to this form.

Box No. IX CHECK LIST (To be filled in by the Applicant)

This international application contains the following number of sheets

- | | | |
|----------------|----------|------------------|
| 1. request | <u>3</u> | sheets |
| 2. description | <u>7</u> | sheets |
| 3. claims | <u>2</u> | sheets |
| 4. abstract | <u>1</u> | sheets |
| 5. drawings | <u>2</u> | sheets |
| Total | | 15 sheets |

Figure number of the drawings (if any) is suggested to accompany the abstract for publication.

This international application as filed is accompanied by the items checked below:

1. ☐ separate signed power of attorney
2. ☒ copy of general power of attorney
3. ☐ priority document(s) (see Box No. VI)
4. ☐ receipt of the fees paid or revenue stamps
5. ☒ cheque for the payment of fees
6. ☐ request to charge deposit account
7. ☐ other document (specify)

(The following is to be filled in by the receiving Office)

1. Date of actual receipt of the purported international application:

22 - April - 91
22 April 1991

2. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:

3. Date of timely receipt of the required corrections under Article 11 of the PCT:

4. Drawings ☐ Received ☐ No Drawings

(The following is to be filled in by the International Bureau)

Date of receipt of the record copy:

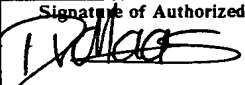
13 MAY 1991 (13. 05. 91)

IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or Agent's File Reference JD/MAW/5096
International Application No. PCT/ GB91/00628		International Filing Date 22/04/91
Receiving Office RO/GB		Priority Date Claimed 23/04/90
Applicant (Name) Insituform Group Ltd. et al.		
I. <input type="checkbox"/> CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹ (Observations on supplemental sheet (2))		
II. <input type="checkbox"/> UNITY OF INVENTION IS LACKING ² (Observations on supplemental sheet (2))		
III. TITLE, ABSTRACT AND FIGURE OF DRAWING		
1. The following indicated items are approved as submitted by the applicant: ³ <input checked="" type="checkbox"/> Title. <input type="checkbox"/> Abstract.		
2. The texts established by this International Searching Authority of the following indicated items are set forth below: <input type="checkbox"/> Title. <input checked="" type="checkbox"/> Abstract.		
<p>The lining of a lateral pipe (12) which leads into a main pipe (10) is effected by everting a resin impregnated tubular lining (14) through an elbow (22) in the main pipe. Eversion is by means of fluid under pressure supplied through a pressure pipe (28). The elbow is held in position by an inflatable bag (38) which is inflated by the said fluid, and the bag also seals the lateral/main pipe junction. The bag is such that at least one additional pressure pipe may extend past the seal arrangement so that at the same time as the first mentioned lateral lining is curing, a second lateral may be similarly lined.</p>		
<input type="checkbox"/> Text of the abstract continued on supplemental sheet (1)		
3. a. <input type="checkbox"/> The definitive contents of the abstract are established by this International Searching Authority as proposed in form PCT/ISA/204, previously sent to the applicant. b. <input checked="" type="checkbox"/> This report is incomplete as far as the abstract is concerned as the time limit for comments by the applicant on the draft prepared by this International Searching Authority has not expired. ⁴		
4. Figure to be published with the abstract ⁵ Figure No. 1 <input type="checkbox"/> None of the Figures <input type="checkbox"/> as suggested by the applicant <input checked="" type="checkbox"/> because the applicant failed to suggest a figure <input type="checkbox"/> because this figure better characterizes the invention		

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 9100628

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC F 16 L 55/16 F 16 L 55/165		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl.5	F 16 L	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category ^o	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	WO-A-8 908 218 (NCC BYGG AB) 8th September 1989, see figures 1,2; claims 1,3 ---	1,2,7,8
A	EP-A-0 241 719 (INSITUFORM GROUP LTD) 21st October 1987, see claims 1,7 ---	1
A	GB-A-2 082 285 (INSITUFORM LTD) 3rd March 1982, see figure 1 ---	1
A	WO-A-8 503 758 (RUMP) 29th August 1985 -----	4-6,8
<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>^o Special categories of cited documents : ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search		Date of Mailing of this International Search Report
02-07-1991		17.09.91
International Searching Authority		Signature of Authorized Officer
EUROPEAN PATENT OFFICE		 Danielle van der Haas

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9100628
SA 46788

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 06/09/91
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A- 8908218	08-09-89	SE-B- 460496 SE-A- 8800653	16-10-89 26-08-89
EP-A- 0241719	21-10-87	CA-A- 1271115 JP-A- 63067135 US-A- 4778553	03-07-90 25-03-88 18-10-88
GB-A- 2082285	03-03-82	None	
WO-A- 8503758	29-08-85	EP-A- 0173702	12-03-86

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 9100628

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)⁹

According to International Patent Classification (IPC) or to both National Classification and IPC

F 16 L 55/16 F 16 L 55/165

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

Classification System

Classification Symbols

Int.Cl.5

F 16 L

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸

III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	WO-A-8 908 218 (NCC BYGG AB) 8th September 1989, see figures 1,2; claims 1,3 ---	1,2,7,8
A	EP-A-0 241 719 (INSITUFORM GROUP LTD) 21st October 1987, see claims 1,7 ---	1
A	GB-A-2 082 285 (INSITUFORM LTD) 3rd March 1982, see figure 1 ---	1
A	WO-A-8 503 758 (RUMP) 29th August 1985 -----	4-6,8

⁹ Special categories of cited documents: ¹⁰

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search

02-07-1991


Date of Mailing of this International Search Report

17.09.91

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer



Danielle van der Haas

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 9100628
SA 46788

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 06/09/91. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A- 8908218	08-09-89	SE-B- 460496 SE-A- 8800653	16-10-89 26-08-89
EP-A- 0241719	21-10-87	CA-A- 1271115 JP-A- 63067135 US-A- 4778553	03-07-90 25-03-88 18-10-88
GB-A- 2082285	03-03-82	None	
WO-A- 8503758	29-08-85	EP-A- 0173702	12-03-86

PATENT COOPERATION TREATY

TO

BAILEY, WALSH & CO.
Attn. Mr. J. DENMARK
5 York Place
LEEDS LS1 2SD
UNITED KINGDOM

FROM the INTERNATIONAL SEARCHING AUTHORITY
identified at the bottom of this page

INVITATION TO COMMENT ON ABSTRACT

issued pursuant to PCT rule 38.2⁽¹⁾

NAME and ADDRESS of the AGENT,
if there is no agent, of the APPLICANT

DATE OF MAILING by the International Searching Authority

17.09.91

APPLICANT'S OR AGENT'S FILE REFERENCE

JD/MAW/5096

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

International Application No.

PCT/GB91/00628

International Filing Date

22/04/91

Applicant (Name)

Insituform Group Ltd. et al.

INVITATION

This International Searching Authority has found that the abstract contained in the above-identified international application does not comply with the requirements relating to the contents and form of the abstract for the reasons indicated below.⁽²⁾

Pls. see rule 8.1(d) - PCT


Consequently this International Searching Authority has established the abstract⁽¹⁾ which is attached hereto.




THE APPLICANT IS HEREBY INVITED TO COMMENT ON THIS ABSTRACT WITHIN 1 MONTH FROM THE DATE OF MAILING INDICATED ABOVE.⁽²⁾

Computation of the time limit starts on the day following the date of mailing of the present invitation. Within this time limit any comments have to reach this International Searching Authority.

THE INTERNATIONAL SEARCHING AUTHORITY

EUROPEAN PATENT OFFICE
Branch at The Hague

 P.O. Box 5818 Patentlaan, 2
2280 HV RIJSWIJK (ZH)
The Netherlands

 Telex 31651  (070) 340-2040  (070) 340-3016 (Fax)

ISA/EP

NOTES TO FORM PC1/ISA/204

These notes are intended to facilitate the use of the present form. For full information, see the text of the Patent Cooperation Treaty and the texts of the Regulations and Administrative Instructions under that Treaty. In case of discrepancy between these Notes and the said texts, the latter are applicable. "Article" refers to Articles of the Treaty, "Rule" refers to Rules of the Regulations and "Section" refers to Sections of the Administrative Instructions.

(1) "If the international application does not contain an abstract and the International Searching Authority has not received a notification from the receiving Office to the effect that the applicant has been invited to furnish an abstract, or if the said Authority finds that the abstract does not comply with Rule 8, it shall itself establish an abstract (in the language in which the international application is published). In the latter case, it shall invite the applicant to comment on the abstract established by it within 1 month from the date of invitation. (Rule 38.2(a))

"The definitive contents of the abstracts shall be determined by the International Searching Authority." (Rule 38.2(b))

(2) "(a) The abstract shall consist of the following:

(i) a summary of the disclosure as contained in the description, the claims, and any drawings; the summary shall indicate the technical field to which the invention pertains and shall be drafted in a way which allows the clear understanding of the technical problem, the gist of the solution of that problem through the invention, and the principal use or uses of the invention;

(ii) where applicable, the chemical formula which, among all the formulae contained in the international application, best characterizes the invention.

(b) The abstract shall be as concise as the disclosure permits (preferably 50 to 150 words if it is in English or when translated into English.)

(c) The abstract shall not contain statements on the alleged merits or value of the claimed invention or on its speculative application.

(d) Each main technical feature mentioned in the abstract and illustrated by a drawing in the international applications shall be followed by a reference sign, placed between parentheses". (Rule 8.1)

"The abstract shall be so drafted that it can efficiently serve as a scanning tool for purposes of searching in the particular art, especially by assisting the scientist, engineer or researcher in formulating an opinion on whether there is a need for consulting the international application itself". (Rule 8.3)

PATENT COOPERATION TREATY

TO
BAILEY, WALSH & CO.
Attn. Mr. J. DENMARK
5 York Place
LEEDS LS1 2SD
UNITED KINGDOM

FROM the INTERNATIONAL SEARCHING AUTHORITY
identified at the bottom of this page

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

issued pursuant to PCT Rule 44.1

RECEIVED 23 SEP 1991

NAME and ADDRESS of the AGENT,
if there is no agent, of the APPLICANT

DATE OF MAILING by the International Searching Authority

17.09.91

APPLICANT'S OR AGENT'S FILE REFERENCE

JD/MAW/5096

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

International Application No.

PCT/GB91/00628

International Filing Date

22/04/91

Applicant (Name)

Insituform Group Ltd. et al.

NOTIFICATION

The applicant is hereby notified that, in regard to the above identified international application, this international Searching Authority transmits herewith:

1. ☒ the international search report and photocopies of the cited documents

THE ATTENTION OF THE APPLICANT IS DRAWN TO THE TIME LIMIT FOR AMENDING BEFORE THE INTERNATIONAL BUREAU ACCORDING TO ARTICLE 19(1) AND RULE 46.1 (see notes on reverse side). THE AMENDMENTS ARE TO BE SUBMITTED DIRECT TO THE INTERNATIONAL BUREAU WHOSE ADDRESS IS:

WIPO
34, chemin des Colombettes
1211 Geneva 20
Switzerland


2. ☐ the declaration to the effect that no international search report will be established.

☐ Applicant is further notified that, the protest against payment of an additional fee under Rule 40.2(c) together with the decision thereon has been transmitted to the International Bureau together with his request to forward the texts of both the protest and the decision thereon to designated Offices

☐ A separate communication concerning the refund of the search fee will be sent to you at a later date.

THE INTERNATIONAL SEARCHING AUTHORITY

EUROPEAN PATENT OFFICE
Branch at The Hague

 P.O. Box 5818 Patentlaan, 2
2280 HV RIJSWIJK (ZH)
The Netherlands

☎ Telex 31651 ☎ (070) 340-2040 ☎ (070) 340-3016 (Fax)

Authorized Officer



Danielle van der Haeg

19 SEP 1991

These notes are intended to facilitate the use of the present form. For full information, see the text of the Patent Cooperation Treaty and the texts of the Regulations and Administrative Instructions under that Treaty. In case of discrepancy between these Notes and the said texts, the latter are applicable. "article" refers to Articles of the Treaty, "Rule" refers to Rules of the Regulations and "Section" refers to Sections of the Administrative Instructions.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER PCT ARTICLE 19

The applicant has, after having received the international search report, one opportunity to amend the claims of the international application by filing amendments directly with the International Bureau.

TIME LIMIT

The time limit for filing amendments to the claims is 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever period expires later.

LANGUAGE

Amendments must be made in the language in which the international application is published.

FORM OF AMENDMENTS

The applicant must submit a replacement sheet for each sheet of the claim which, on account of an amendment or amendments differs from the sheet originally filed.

"Amendments to the claims under Article 19 or Article 34(2)(b) may be made either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed. All the claims appearing on a replacement sheet shall be numbered in arabic numerals. Where a claim is cancelled, no renumbering of the other claims shall be required. In all cases where claims are renumbered, they shall be renumbered consecutively." (Section 205(a))

LETTER SUBMITTING AMENDMENTS

Replacement sheets containing amended claims must be submitted to the International Bureau with a letter. The letter must indicate the difference between the claims as filed and the claims as amended. It must, in particular, indicate "in connection with each claim appearing in the international application (it being understood that indications concerning several claims may be grouped), whether,

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaced one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed." (Section 205(b))

The following examples illustrate the manner in which amendments must be explained in the accompanying letter:

1. [Where originally there were 48 claims and after amendment of some claims there are 5]: "Claims 1 to 29, 31, 32, 34, 35, 37 to 48 replaced by amended claims bearing the same numbers; claims 30, 33 and 36 unchanged; new claims 49 to 51 added."
2. [Where originally there were 15 claims and after amendment of all claims there are 11]: "Claims 1 to 15 replaced by amended claims 1 to 11."
3. [Where originally there were 14 claims and the amendments consist in cancelling some claims and in adding new claims]: "Claims 1 to 6 and 14 unchanged; claims 7 to 13 cancelled; new claims 15, 16 and 17 added." or "Claims 7 to 13 cancelled; new claims 15, 16 and 17 added; all other claims unchanged."
4. [Where various kinds of amendments are made]: "Claims 1-10 unchanged; claims 11 to 13, 18 and 19 cancelled; claims 14, 15 and 16 replaced by amended claim 14; claim 17 subdivided into amended claims 15, 16 and 17; new claims 20 and 21 added."

STATEMENT UNDER ARTICLE 19(1)

The applicant may file together with the amendments a brief statement (not exceeding 500 words if in English or if translated into English) explaining them and indicating any impact that such amendments might have on the description and the drawings (which cannot be amended under Article 19(1)).

The statement must not be confounded with and does not replace the letter indicating the differences between the claims as filed and as amended (see above). The statement must be filed on a separate sheet and must be identified as such by a heading, preferably by using the words "Statement under Article 19(1)."

"The statement shall contain no disparaging comments on the international search report or the relevance of citations contained in that report. Reference to citations, relevant to a given claim, contained in the international search report may be made only in connection with an amendment of that claim." Rule 46.4(b))

FILING OF COPY OF AMENDMENTS TO INTERNATIONAL PRELIMINARY AUTHORITY

"If, at the time of filing such amendments [under Article 19], a demand for international preliminary examination has already been submitted, the applicant shall, at the same time as he files the amendments with the International Bureau, also file a copy of such amendments with the International Preliminary Examining Authority." (Rule 62.2(a), second sentence)

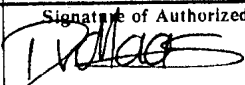
PATENT COOPERATION TREATY
INTERNATIONAL SEARCH REPORT

IDENTIFICATION OF THE INTERNATIONAL APPLICATION	Applicant's or Agent's File Reference JD/MAW/5096
International Application No. PCT/ GB91/00628	International Filing Date 22/04/91
Receiving Office RO/GB	Priority Date Claimed 23/04/90
Applicant (Name) Insituform Group Ltd. et al.	
I. <input type="checkbox"/> CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹ (Observations on supplemental sheet (2))	
II. <input type="checkbox"/> UNITY OF INVENTION IS LACKING ² (Observations on supplemental sheet (2))	
III. TITLE, ABSTRACT AND FIGURE OF DRAWING	
<p>1. The following indicated items are approved as submitted by the applicant:³</p> <p><input checked="" type="checkbox"/> Title. <input type="checkbox"/> Abstract.</p> <p>2. The texts established by this International Searching Authority of the following indicated items are set forth below:</p> <p><input type="checkbox"/> Title.</p> <p><input checked="" type="checkbox"/> Abstract.</p> <p style="margin-top: 20px;">The lining of a lateral pipe (12) which leads into a main pipe (10) is effected by everting a resin impregnated tubular lining (14) through an elbow (22) in the main pipe. Eversion is by means of fluid under pressure supplied through a pressure pipe (28). The elbow is held in position by an inflatable bag (38) which is inflated by the said fluid, and the bag also seals the lateral/main pipe junction. The bag is such that at least one additional pressure pipe may extend past the seal arrangement so that at the same time as the first mentioned lateral lining is curing, a second lateral may be similarly lined.</p> <p style="margin-top: 40px;"><input type="checkbox"/> Text of the abstract continued on supplemental sheet (1)</p> <p>3. a. <input type="checkbox"/> The definitive contents of the abstract are established by this International Searching Authority as proposed in form PCT/ISA/204, previously sent to the applicant.</p> <p>b. <input checked="" type="checkbox"/> This report is incomplete as far as the abstract is concerned as the time limit for comments by the applicant on the draft prepared by this International Searching Authority has not expired.⁴</p> <p>4. Figure to be published with the abstract⁵</p> <p>Figure No. 1 <input type="checkbox"/> None of the Figures</p> <p><input type="checkbox"/> as suggested by the applicant</p> <p><input checked="" type="checkbox"/> because the applicant failed to suggest a figure</p> <p><input type="checkbox"/> because this figure better characterizes the invention</p>	

INTERNATIONAL SEARCH REPORT

International Application No

PCT/GB 9100628

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶		
According to International Patent Classification (IPC) or to both National Classification and IPC F 16 L 55/16 F 16 L 55/165		
II. FIELDS SEARCHED		
Minimum Documentation Searched ⁷		
Classification System	Classification Symbols	
Int.Cl.5	F 16 L	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸		
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹		
Category °	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	WO-A-8 908 218 (NCC BYGG AB) 8th September 1989, see figures 1,2; claims 1,3 ---	1,2,7,8
A	EP-A-0 241 719 (INSITUFORM GROUP LTD) 21st October 1987, see claims 1,7 ---	1
A	GB-A-2 082 285 (INSITUFORM LTD) 3rd March 1982, see figure 1 ---	1
A	WO-A-8 503 758 (RUMP) 29th August 1985 -----	4-6,8
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>° Special categories of cited documents : ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&" document member of the same patent family</p> </div> </div>		
IV. CERTIFICATION		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
02-07-1991	17.09.91	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	 Danielle van der Haas	

ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 9100628

SA 46788

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 06/09/91. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A- 8908218	08-09-89	SE-B- 460496 SE-A- 8800653	16-10-89 26-08-89
EP-A- 0241719	21-10-87	CA-A- 1271115 JP-A- 63067135 US-A- 4778553	03-07-90 25-03-88 18-10-88
GB-A- 2082285	03-03-82	None	
WO-A- 8503758	29-08-85	EP-A- 0173702	12-03-86

Box No. IV AGENT (IF ANY) OR COMMON REPRESENTATIVE (IF ANY); ADDRESS FOR NOTIFICATIONS (IN CERTAIN CASES). A common representative may be appointed only if there are several applicants and if no agent is or has been appointed; the common representative must be one of the applicants.
The following person (includes, where applicable, a legal entity) is hereby/has been appointed as agent or common representative to act on behalf of the applicant(s) before the competent International Authorities:

Name and address, including postal code and country:

If the space below is used instead for an address for notifications, mark here ☐

J. Denmark,
Bailey Walsh & Co.,
5 York Place,
Leeds LS1 2SD

Telephone number: 0532-433824 Telegraphic address: **INVENTIONS LEEDS I** Teleprinter address: 557830 WALPATG

Box No. V DESIGNATION OF GROUPS OF STATES OR STATES (1); CHOICE OF CERTAIN KINDS OF PROTECTION OR TREATMENT. The following designations are hereby made (please mark the applicable check-boxes):

Regional Patent

☒ **EP European Patent(2):** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, DE Germany (Federal Republic of), DK Denmark, ES Spain, FR France, GB United Kingdom, IT Italy, LU Luxembourg, NL Netherlands, SE Sweden,
and any other State which is a Contracting State of the European Patent Convention and of the PCT

☐ **OA OAPI Patent:** Benin, Burkina Faso, Cameroon, Central African Republic, Chad, Congo, Gabon, Mali, Mauritania, Senegal, Togo,
and any other State which is a Contracting State of OAPI and of the PCT; if other OAPI title desired, specify on dotted line(3):

National Patent (if other kind of protection or treatment desired, specify on dotted line(3))

<input type="checkbox"/> AT Austria(3)	<input checked="" type="checkbox"/> KR Republic of Korea(3)
<input checked="" type="checkbox"/> AU Australia(3)	<input type="checkbox"/> LK Sri Lanka
<input type="checkbox"/> BB Barbados	<input type="checkbox"/> LU Luxembourg(3)
<input type="checkbox"/> BG Bulgaria(3)	<input type="checkbox"/> MC Monaco(3)
<input type="checkbox"/> BR Brazil(3)	<input type="checkbox"/> MG Madagascar
<input checked="" type="checkbox"/> CA Canada	<input type="checkbox"/> MW Malawi(3)
<input type="checkbox"/> CH and LI Switzerland and Liechtenstein	<input type="checkbox"/> NL Netherlands
<input type="checkbox"/> DE Germany (Federal Republic of)(3)	<input checked="" type="checkbox"/> NO Norway
.....	<input type="checkbox"/> RO Romania
<input type="checkbox"/> DK Denmark	<input type="checkbox"/> SD Sudan
<input type="checkbox"/> ES Spain(3)	<input type="checkbox"/> SE Sweden
<input checked="" type="checkbox"/> FI Finland	<input checked="" type="checkbox"/> SU Soviet Union(3)
<input type="checkbox"/> GB United Kingdom
<input checked="" type="checkbox"/> HU Hungary	<input checked="" type="checkbox"/> US United States of America(3)
<input checked="" type="checkbox"/> JP Japan(3)
<input type="checkbox"/> KP Democratic People's Republic of Korea(3)

Space reserved for designating States (for the purposes of a national patent) which have become party to the PCT after the issuance of this sheet:

- (1) The applicant's choice of the order of designations may be indicated by marking the check-boxes with sequential arabic numerals (see also the "Notes to Box No. V").
(2) The selection of particular States for a European patent can be made upon entering the national (regional) phase before the European Patent Office (see also the "Notes to Box No. V").
(3) If another kind of protection or a title of addition or, in the United States of America, treatment as a continuation or a continuation-in-part is desired, specify according to the instructions given in the "Notes to Box No. V."

Box No. VI PRIORITY CLAIM (IF ANY). The priority of the following earlier application(s) is hereby claimed:

Country (country in which it was filed if national application; one of the countries for which it was filed if regional or international application)	Filing Date (day, month, year)	Application No.	Office of Filing (fill in only if the earlier application is an international application or a regional application)
(1) U.K.	23 . 4 . 1990	9009073.9	
(2)			
(3)			

(Letter codes may be used to indicate country and/or Office of filing)

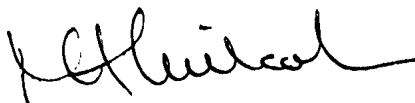
When the earlier application was filed with the Office which, for the purposes of the present international application, is the receiving Office, the applicant may, *against payment of the required fee*, ask the following:
☐ the receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the above-mentioned earlier application/of the earlier applications identified above by the numbers (insert the applicable numbers)
Box No. VII EARLIER SEARCH (IF ANY). Fill in where a search (international, international-type or other) by the International Searching Authority has already been requested (or completed) and the said Authority is now requested to base the international search, to the extent possible, on the results of the said earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request.

International application number or number and country (or regional Office) of other application:

International/regional/national filing date

Date of request for search:

Number (if available) given to search request:

Box No. VIII SIGNATURE OF APPLICANT(S) OR AGENT


M. A. Willcocks
Attorney - INSITUFORM GROUP LIMITED

If the present Request form is signed on behalf of any applicant by an agent, a separate power of attorney appointing the agent and signed by the applicant is required. If in such case it is desired to make use of a general power of attorney (deposited with the receiving Office), a copy thereof must be attached to this form.

Box No. IX CHECK LIST (To be filled in by the Applicant)

This international application contains the following number of sheets

1. request	3	sheets
2. description	7	sheets
3. claims	2	sheets
4. abstract	1	sheets
5. drawings	2	sheets
Total		15 sheets

Figure number of the drawings (if any) is suggested to accompany the abstract for publication.

This international application as filed is accompanied by the items checked below:

- ☐ separate signed power of attorney
- ☒ copy of general power of attorney
- ☐ priority document(s) (see Box No. VI)
- ☐ receipt of the fees paid or revenue stamps
- ☒ cheque for the payment of fees
- ☐ request to charge deposit account
- ☐ other document (specify)

(The following is to be filled in by the receiving Office)

- Date of actual receipt of the purported international application:
- Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:
- Date of timely receipt of the required corrections under Article 11 of the PCT:
- Drawings ☐ Received ☐ No Drawings

(The following is to be filled in by the International Bureau)

Date of receipt of the record copy:

INTERNATIONAL APPLICATION
UNDER THE
PATENT COOPERATION TREATY
REQUEST

THE UNDERSIGNED REQUESTS THAT THE PRESENT
INTERNATIONAL APPLICATION BE PROCESSED
ACCORDING TO THE PATENT COOPERATION TREATY

(The following is to be filled in by the receiving Office)

INTERNATIONAL
APPLICATION No:

INTERNATIONAL
FILING DATE:

(Stamp)

Name of receiving Office and "PCT International Application"

Applicant's or Agent's File Reference
(Indicated by applicant if desired) JD/MAW/5096

Box No. I TITLE OF INVENTION

"IMPROVEMENTS RELATING TO THE LINING OF
PIPELINES OR PASSAGEWAYS"

Box No. II APPLICANT (WHETHER OR NOT ALSO INVENTOR); DESIGNATED STATES FOR WHICH HE/SHE/IT IS
APPLICANT. Use this box for indicating the applicant or, if there are several applicants, one of them. If more than one person (includes, where
applicable, a legal entity) is involved, continue in Box No. III.

The person identified in this box is (check one only): ☐ applicant and inventor* ☒ applicant only

Name and address:**

INSITUFORM GROUP LIMITED
3/4 Hill Street,
Douglas,
Isle of Man

Telephone number
(including area code)

Telegraphic address:

Teleprinter address:

Country of nationality: U. K.

Country of residence:*** U. K.

The person identified in this box is *applicant* for the purposes of (check one only):

☐ all designated States

☒ all designated States except
the United States of America

☐ the United States
of America only

☐ the States indicated
in the "Supplemental Box"

Box No. III FURTHER APPLICANTS, IF ANY; (FURTHER) INVENTORS, IF ANY; DESIGNATED STATES FOR
WHICH THEY ARE APPLICANTS (IF APPLICABLE). A separate sub-box has to be filled in in respect of each person (includes, where
applicable, a legal entity). If the following two sub-boxes are insufficient, continue in the "Supplemental Box," (giving there for each addi-
tional person the same indications as those requested in the following two sub-boxes) or by using a "continuation sheet."

The person identified in this sub-box is (check one only): ☒ applicant and inventor* ☐ applicant only ☐ inventor only*

Name and address:**

ERIC WOOD
Witch's Mill,
Arbory Road,
Castletown,
ISLE OF MAN

If the person identified in this sub-box is *applicant* (or *applicant and inventor*), indicate also:

Country of nationality: U. K.

Country of residence:*** U. K.

and whether that person is *applicant* for the purposes of (check one only):

☐ all designated States

☐ all designated States except
the United States of America

☒ the United States
of America only

☐ the States indicated
in the "Supplemental Box"

The person identified in this sub-box is (check one only):

☐ applicant and inventor* ☐ applicant only ☐ inventor only*

Name and address:**

If the person identified in this sub-box is *applicant* (or *applicant and inventor*), indicate also:

Country of nationality:

Country of residence:***

and whether that person is *applicant* for the purposes of (check one only):

☐ all designated States

☐ all designated States except
the United States of America

☐ the United States
of America only

☐ the States indicated
in the "Supplemental Box"

* If the person indicated as "applicant and inventor" or as "inventor only" is not an *inventor* for the purposes of all the designated States,
give the necessary indications in the "Supplemental box."

** Indicate the name of a natural person by giving his/her family name first followed by the given name(s). Indicate the name of a legal entity by
its full official designation. In the address, include both the postal code (if any) and the country (name).

*** If residence is not indicated, it will be assumed that the country of residence is the same as the country indicated in the address.

PATENT COOPERATION TREATY

INTERNATIONAL APPLICATION NO. PCT/GB91/00628	
NOTIFICATION TO THE DESIGNATED OFFICE OF RECEIPT OF RECORD COPY issued under PCT Rule 24.2(a)	To: United States Patent and Trademark Office Washington, D.C.
APPLICANT'S OR AGENT'S FILE REFERENCE: JD/MAW/5096	in its capacity as a designated Office
DATE OF MAILING OF THIS NOTIFICATION: 13 May 1991 (13.05.91)	From: The International Bureau of WIPO 1211 Geneva 20 Switzerland
NAME(S) OF APPLICANT(S): WOOD, Eric	
INTERNATIONAL FILING DATE: 22 April 1991 (22.04.91)	
PRIORITY DATE(S) CLAIMED: 23 April 1990 (23.04.90)	
DATE OF RECEIPT OF RECORD COPY BY INTERNATIONAL BUREAU: 13 May 1991 (13.05.91)	
A. Sinha (Authorized Officer)	

PATENT COOPERATION TREATY

INTERNATIONAL APPLICATION NO. PCT/GB91/00628

NOTIFICATION OF ELECTION
issued pursuant to PCT
Rule 61.2

To:

United States Patent
and Trademark Office
Washington, D.C.

in its capacity as an elected Office

DATE OF MAILING OF
THIS NOTIFICATION:
03 December 1991 (03.12.91)

From:
The International Bureau of WIPO
1211 Geneva 20
Switzerland

APPLICANT (NAME):

WOOD, Eric

INTERNATIONAL FILING DATE:

22 April 1991 (22.04.91)

PRIORITY DATE CLAIMED:

23 April 1990 (23.04.90)

The said election was made in the demand received by the International Preliminary
Examining Authority on:

13 November 1991 (13.11.91)

C. Combaz
(Authorized Officer)

PATENT COOPERATION TREATY

TO

Mr J Denmark
5 York Place
LEEDS
LS1 2SD

FROM the INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY
identified below

WRITTEN OPINION

Issued pursuant to PCT Rules 66.2 (1) or 66.4(a) (2)

DATE OF MAILING by the International Preliminary
Examining Authority 21 JAN 1992

APPLICANT'S OR AGENT'S FILE REFERENCE
JO/MAW/5096

Inscribe NAME and ADDRESS of the AGENT and if there
is no agent, of the APPLICANT

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

International Application No.

PCT/GB91/00628

International Filing Date

22.04.91

Applicant (Name)

Insituform Group Limited et al

Receiving Office

UK Patent Office

Priority Date Claimed

23.04.90

WRITTEN OPINION

With reference to the above-identified international application, this constitutes
the first (first, etc.) written opinion by this International Preliminary
Examining Authority.

I. BASIS OF OPINION

The examination is being carried out on the following application documents:

- ☒ the application documents as filed
- ☐ description, pages, as originally filed
- ☐ description, pages filed with your letter of
- ☐ claim(s), as originally filed
- ☐ claim(s), filed with your letter of
- ☐ drawings, sheet/fig., as originally filed
- ☐ drawings, sheet/fig., filed with your letter of
- ☐ This opinion has been established as if the amendments indicated on the extra
sheet have not been made, since, for the reasons indicated, they have been
considered to go beyond the disclosure as filed.

II. NON-ESTABLISHMENT OF OPINION ON NOVELTY, INVENTIVE STEP AND INDUSTRIAL
APPLICABILITY

The question whether the claimed invention appears to be novel, to involve an
inventive step (to be non-obvious), and to be industrially applicable will not for
the reasons indicated below be gone into in respect of:

1. ☐ the above-identified international application.
2. ☐ claims Nos. _____ (specify particular claims).
- ☐ Said international application, or said claims Nos. _____ relate to the
following subject matter⁽³⁾ which does not require an international prelim-
inary examination. (specify)
- ☐ The description, claims, or drawings (indicate particular elements) or said
claims Nos. _____ are so unclear that no meaningful opinion could be
formed. ⁽³⁾
- ☐ The claims, or said claims Nos. _____ are so inadequately supported by
the description that no meaningful opinion could be formed. ⁽³⁾

22 JAN 1992

These Notes are intended to facilitate the use of the present form. For full information, see the text of the Patent Cooperation Treaty and the texts of the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and the said texts, the latter are applicable. "Article" refers to Articles of the Treaty, "Rule" refers to Rules of the Regulations and "Section" refers to Sections of the Administrative Instructions.

(1) "If the International Preliminary Examining Authority

- (i) considers that the international application has any of the defects described in Article 34(4),
- (ii) considers that the international preliminary examination report should be negative in respect of any of the claims because the invention claimed therein does not appear to be novel, does not appear to involve an inventive step (does not appear to be non-obvious), or does not appear to be industrially applicable,
- (iii) notices that there is some defect in the form or contents of the international application under the Treaty or these Regulations,
- (iv) considers that any amendment goes beyond the disclosure in the international application as filed, or
- (v) wishes to accompany the international preliminary examination report by observations on the clarity of the claims, the description, and the drawings, or the question whether the claims are fully supported by the description,

the said Authority shall notify the applicant accordingly in writing. Where the national law of the national Office acting as International Preliminary Examining Authority does not allow multiple dependent claims to be drafted in a manner different from that provided for in the second and third sentences of Rule 6.4(a), the International Preliminary Examining Authority may, in case of failure to use that manner of claiming, apply Article 34(4)(b). In such case, it shall notify the applicant accordingly in writing." (Rule 66.2(a))

"The notification shall fully state the reasons for the opinion of the International Preliminary Examining Authority." (Rule 66.2(b))

"The notification shall invite the applicant to submit a written reply together, where appropriate, with amendments." (Rule 66.2(c))

"The notification shall fix a time limit for the reply. The time limit shall be reasonable under the circumstances. It shall normally be 2 months after the date of notification. In no case shall it be shorter than 1 month after the said date. It shall be at least 2 months after the said date where the international search report is transmitted at the same time as the notification. In no case shall it be more than 3 months after the said date." (Rule 66.2(d))

(2) "If the International Preliminary Examining Authority wishes to issue one or more additional written opinions, it may do so, and Rules 66.2 and 66.3 shall apply." (Rule 66.4(a))

(3) "If the International Preliminary Examining Authority considers

(i) that the international application relates to a subject matter on which the International Preliminary Examining Authority is not required, under the Regulations, to carry out an international preliminary examination, and in the particular case decides not to carry out such examination, or

(ii) that the description, the claims, or the drawings, are so unclear, or the claims are so inadequately supported by the description, that no meaningful opinion can be formed on the novelty, inventive step (non-obviousness), or industrial applicability, of the claimed invention,

the said Authority shall not go into the questions referred to in Article 33(1) and shall inform the applicant of this opinion and the reasons therefor." (Article 34(4)(a))

WRITTEN OPINION (Continued)

III. NEGATIVE STATEMENT IN REGARD TO NOVELTY, INVENTIVE STEP AND INDUSTRIAL APPLICABILITY OF CLAIMS

The statement under Article 35(2) should be negative in respect of the claims indicated below. The criteria not satisfied in respect of such claims are indicated by the letter abbreviation: N (for Novelty); IS (for Inventive Step); and IA (for Industrial Applicability).

Claim 1 (N, IS)

IV. CITATIONS AND EXPLANATIONS IN REGARD TO NOVELTY, INVENTIVE STEP AND INDUSTRIAL APPLICABILITY OF CLAIMS

No. of Claim / Relevant Supporting Documents Cited / Explanation

See separate sheet

Rule 67 entitled "Subject Matter Under Article 34(4)(a)(i)" reads as follows:

"No International Preliminary Examining Authority shall be required to carry out an international preliminary examination on an international application if, and to the extent to which, its subject matter is any of the following:

- (i) scientific and mathematical theories,
- (ii) plant or animal varieties or essentially biological processes for the production of plants and animals, other than microbiological processes and the products of such processes,
- (iii) schemes, rules or methods of doing business, performing purely mental acts or playing games,
- (iv) methods for treatment of the human or animal body by surgery or therapy, as well as diagnostic methods,
- (v) mere presentations of information,
- (vi) computer programs to the extent that the International Preliminary Examining Authority is not equipped to carry out an international preliminary examination concerning such programs."

(4) "The applicant may respond to the invitation referred to in Rule 66.2(c) of the International Preliminary Examining Authority by making amendments or--if he disagrees with the opinion of that Authority--by submitting arguments, as the case may be, or do both." (Rule 66.3(a))

"Any response shall be submitted directly to the International Preliminary Examining Authority." (Rule 66.3(b))

"On the request of the applicant, the International Preliminary Examining Authority may give him one or more additional opportunities to submit amendments or arguments." (Rule 66.4(b))

"The applicant shall be required to submit a replacement sheet for every sheet of the international application which, on account of an amendment, differs from the sheet originally filed. The letter accompanying the replacement sheets shall draw attention to the differences between the replaced sheets and the replacement sheets. To the extent that any amendment results in the cancellation of an entire sheet, that amendment shall be communicated in a letter." (Rule 66.8(a))

"If the international application has been filed in a language other than the language in which it is published, any amendment, as well as any letter referred to in Rule 66.8(a), shall be submitted in the language of publication." (Rule 66.9)

"Amendments to the claims under Article 19 or Article 34(2)(b) may be made either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed. All the claims appearing on a replacement sheet shall be numbered in arabic numerals. Where a claim is cancelled, no renumbering of the other claims shall be required. In all cases where claims are renumbered, they shall be renumbered consecutively." (Section 205(a))

WRITTEN OPINION (Continued)

V. CERTAIN DEFECTS IN THE INTERNATIONAL APPLICATION

The following defects in the form or contents of the above-identified international application under the Treaty or the Regulations have been noted.

See separate sheet

VI. CERTAIN OBSERVATIONS ON THE INTERNATIONAL APPLICATION

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are notified:

See separate sheet

VII. INVITATION

APPLICANT IS INVITED TO SUBMIT A WRITTEN REPLY ACCOMPANIED, WHERE APPROPRIATE, BY AMENDMENTS⁽⁴⁾ WITHIN two MONTHS/ _____ DAYS OF THE DATE OF MAILING INDICATED ON THE FIRST SHEET.

THE INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

Name and Mailing Address

THE PATENT OFFICE
CARDIFF RD., NEWPORT
GWENT NP9 1RH

Authorized Officer

[Signature]

17.1.92

NOTES TO FORM PCT/IPEA/408 (Continued)

"The applicant shall, in the letter referred to in the second and third sentences of Rule 46.5(a) or of Rule 66.8(a), indicate the differences between the claims as filed and the claims as amended. He shall, in particular, indicate in the said letter, in connection with each claim appearing in the international application (it being understood that identical indications concerning several claims may be grouped), whether:

- (i) the claim is unchanged;
- (ii) the claim is cancelled;
- (iii) the claim is new;
- (iv) the claim replaces one or more claims as filed;
- (v) the claim is the result of the division of a claim as filed." (Section 205(b))

The attention of the applicant is also drawn to the examples given, in respect of the amendments of claims, in the Notes to Form PCT/ISA/220, which he received from the International Searching Authority; these examples are also valid in respect of amendments made in the course of the international preliminary examination.

FIRST WRITTEN OPINION

PCT/GB 91.00628

Time for reply: 2 MONTHS

Failure to reply within the time limit set may result in the automatic issue of the preliminary examination report based on this opinion.

Please address your reply to PCT (Chapter II) Section, Room G.R15, Concept House, Cardiff Road, Newport, Gwent, NP9 1RH. Please note that manuscript amendments are not permitted and all amendments should take the form of re-typed pages supplied in triplicate. Minimal typed inter-lineations are allowable. Please indicate which pages are cancelled and replaced by new pages.

DEFECTS

The claims are not in two part form as required by Rule 6.3 (b).

EXPLANATIONS REGARDING NOVELTY ETC

All claims meet the requirement of industrial applicability.

All claims other than claim 1 meet the requirements of novelty and inventive step since the Prior Art reported by ISA and known to the Examiner does not disclose lining a lateral by feeding a resin impregnated lining therein, using a pressurized fluid medium in conjunction with sealing arrangements, as set out in claims 2-8. However it would seem that the phrase "a seal arrangement ... place" in the last three lines of claim 1 embraces the arrangement disclosed in Figure 4 of GB 2096265 (Insituform) in that claim 1, as currently worded, appears to lack novelty and inventive step when GB 2096265 is considered.

OBSERVATIONS

The description on page 2 lines 25-28 does not appear to read clearly.

Reference numeral 90 on pages 7 and 5 does not seem to be shown on the drawings.

The Examiner dealing with this case is Mr B J Proctor

Telephone: 071-829 6771 (071-438-4862)
w.e.f. 1.2.92

PATENT COOPERATION TREATY

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or Agent's File Reference JD/MDW/5096								
International Application No. PCT/GB 91/00628	International Filing Date (22.04.91) 22nd April 1991									
Receiving Office UK PATENT OFFICE	Priority Date Claimed (23.04.90) 23rd April 1990									
Applicant (Name) INSITUFORM GROUP LTD ET AL										
BASIS OF REPORT										
<p>1. AMENDMENTS AND/OR RECTIFICATIONS¹ — The amendments and/or rectifications made before this International Preliminary Examining Authority in respect of the claims, the description, and/or drawings in the above-identified international application are annexed to this report.</p> <p>a. <input type="checkbox"/> This report has been established on the basis of the following application documents:</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> the application documents as filed </td> <td style="width: 50%;"></td> </tr> <tr> <td style="vertical-align: top;"> <input checked="" type="checkbox"/> description, pages description, pages description, pages description, pages </td> <td style="vertical-align: top;"> as originally filed filed with your letter of filed with your letter of filed with your letter of </td> </tr> <tr> <td style="vertical-align: top;"> <input checked="" type="checkbox"/> claim(s) claim(s) 1-7 claim(s) claim(s) </td> <td style="vertical-align: top;"> as originally filed filed with your letter of 24.03.92 filed with your letter of filed with your letter of </td> </tr> <tr> <td style="vertical-align: top;"> <input type="checkbox"/> drawings, sheet fig. drawings, sheet fig. </td> <td style="vertical-align: top;"> as originally filed filed with your letter of </td> </tr> </table> <p>b. <input type="checkbox"/> The amendments resulted in the cancellation of the following sheets:</p> <p>c. <input type="checkbox"/> This report has been established as if the amendments indicated on the extra sheet have not been made, since, for the reasons indicated, they have been considered to go beyond the disclosure as filed.</p>			<input type="checkbox"/> the application documents as filed		<input checked="" type="checkbox"/> description, pages description, pages description, pages description, pages	as originally filed filed with your letter of filed with your letter of filed with your letter of	<input checked="" type="checkbox"/> claim(s) claim(s) 1-7 claim(s) claim(s)	as originally filed filed with your letter of 24.03.92 filed with your letter of filed with your letter of	<input type="checkbox"/> drawings, sheet fig. drawings, sheet fig.	as originally filed filed with your letter of
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<input type="checkbox"/> drawings, sheet fig. drawings, sheet fig.	as originally filed filed with your letter of									
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<p><small>* Where replacement sheets are annexed to this report, a translation of these replacement sheets must be furnished to the elected Offices within the time limit applicable under PCT Article 39(1).</small></p>										

CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all.) *

According to International Patent Classification (IPC) or to both National Classification and IPC

F16L 55/16; F16L 55/165

REASONED STATEMENT AS TO CLAIMS MEETING CRITERIA OF NOVELTY (N), INVENTIVE STEP (IS) AND INDUSTRIAL APPLICABILITY (IA): AND CITATIONS AND EXPLANATIONS SUPPORTING SUCH STATEMENT


CLAIM NUMBER	STATEMENT (CRITERIA)	CITATIONS AND EXPLANATIONS
1-7	N (YES) IS (YES) IA (YES)	<p>All claims meet the requirement of industrial applicability.</p> <p>All claims meet the requirements of novelty and inventive step since the Prior Art reported by ISA and known to the Examiner does not disclose lining laterals by feeding resin impregnated lining therein, using a pressurized fluid medium in conjunction with sealing arrangements employing a plurality of "pressure pipes" for applying pressure fluid to a plurality of laterals.</p>

NON-WRITTEN DISCLOSURES ⁹			
Kind of Non-Written Disclosure	Date of Written Disclosure referring to the Non-Written Disclosure	Date of Non-Written Disclosure	

CERTAIN PUBLISHED DOCUMENTS ¹⁰			
Application/Patent	Date of Publication	Filing Date	Priority Date (Valid Claim)

CERTAIN DEFECTS IN THE INTERNATIONAL APPLICATION ¹¹
<p>The following defects in the form or contents of the international application have been noted.</p> <p style="margin-left: 40px;">The claims are not in two part form as required by Rule 6.3 (b).</p>

CERTAIN OBSERVATIONS ON THE INTERNATIONAL APPLICATION ¹²
<p>The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description have been noted.</p> <p style="margin-left: 40px;">The description on page 2 lines 25-28 does not appear to read clearly.</p> <p style="margin-left: 40px;">Reference numeral 90 on pages 7 and 5 does not seem to be shown on the drawings.</p>

CERTIFICATION	
<p>Date Demand Submitted</p> <p style="margin-left: 40px;">13 NOVEMBER 1991 13.11.91</p>	<p>Date of Completion of the International Preliminary Examination Report</p> <p style="margin-left: 40px;">27th March 1992 (27.3.92)</p>
<p>International Preliminary Examining Authority</p> <p style="margin-left: 40px;">United Kingdom Patent Office</p>	<p>Signature of Authorized Officer</p> <div style="text-align: center;">  </div> <p style="text-align: right; margin-right: 40px;">B J PROCTOR</p>

24 March 1992

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24 03 92

CLAIMS

1. A method of lining a lateral pipe leading into a main pipe, wherein a resin impregnated lining is inserted into the lateral pipe using a fluid medium under pressure, and wherein a seal arrangement forms a seal at the location where the lateral meets the main pipe as curing of the resin takes place, and wherein the fluid medium is supplied to insert the lateral lining by means of a pressure pipe, and at least one additional pressure pipe extends past the seal arrangement so that pressure fluid can be applied to another lateral lining remote from the first mentioned lateral whilst curing of the first mentioned lateral lining is taking place.
2. A method according to Claim 1, wherein the seal is formed by an inflatable means, said means being inflated by the fluid medium used for inserting the lateral lining, but at a lower pressure.
3. A method according to Claim 1 or 2, wherein the seal arrangement comprises an elbow pipe through which the lateral lining is everted to be inserted into the lateral, and the seal arrangement is connected to the elbow.
4. A method according to Claim 3, when taken with Claim 2, wherein the inflatable means comprises a bag or bladder which is inflated against the main pipe surface.
5. A method according to Claim 4, wherein the bag or bladder is in the form of a pair of spaced diametrically opposed inflatable pillows.

24 March 1992:

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24 03 92

6. A method according to any preceding claim wherein the lining tube is provided with a collar which is applied to the location at which the lateral meets the main pipe, and the lining is of finite length and is open ended.
7. Apparatus for inserting a resin impregnated lining into a lateral pipe which leads to a main pipe, comprising an elbow pipe by which the lining may be inverted using fluid medium under pressure into the lateral from the main pipe, said elbow having connected thereto an inflatable sealing arrangement whereby the elbow may be locked in position in the main pipe by means of said fluid medium, and so that a pressure pipe may extend along the main pipe past the sealing arrangement so that a further lining may be inserted into a further lateral whilst the sealing arrangement holds the elbow in position in the main pipe and the resin impregnated first mentioned lining cures.

PATENT COOPERATION TREATY

TO Mr J Denmark
5 York Place
LEEDS
LS1 2SD

FROM the INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY
identified at the bottom of this page

NOTIFICATION OF TRANSMITTAL OF INTERNATIONAL PRELIMINARY EXAMINATION REPORT
issued pursuant to PCT Rule 71.1

Inscribe NAME and ADDRESS of the AGENT and if there is no agent, of the APPLICANT

DATE OF MAILING by the International Preliminary Examining Authority

07 APR 1992

APPLICANT'S NAME AND FILE REFERENCE

JB/MAW/5096

IDENTIFICATION OF THE INTERNATIONAL APPLICATION

International Application No.
PCT/GB91/00628

International Filing Date
(22.04.91) 22nd April 1991

Applicant (Name)

INSITUFORM GROUP LTD ET AL

NOTIFICATION

The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the above-identified international application.

The attention of the applicant is drawn to the reminder contained in Form PCT/IB/332, which he received from the International Bureau, concerning the time limits within which he must perform certain acts before each elected Office.

A copy of the report and its annexes, if any, has this same day also been transmitted to the International Bureau

THE INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

Name and Mailing Address

**THE PATENT OFFICE
CARDIFF RD., NEWPORT
GWENT NP23 1RH**

Authorized Officer

B Proctor

- 8 APR 1992

P A T E N T C O O P E R A T I O N T R E A T Y

APR 27 1992

TO:

United States Patent
and Trademark Office
Washington, D.C.

FROM:

the INTERNATIONAL BUREAU of the
WORLD INTELLECTUAL PROPERTY
ORGANIZATION

NOTIFICATION CONCERNING
DOCUMENTS TRANSMITTED

Issued pursuant to PCT
Article 36(3)(a)

(as elected Office)

Date of Mailing:

13 April 1992 (13.04.92)

NOTIFICATION

The International Bureau transmits herewith the following documents
and number thereof:

1 (number of) copy(s) of the international preliminary
examination report and annexes (Article 36(3)(a)).

This notification is sent to the above addressee in its capacity as
an elected Office.

THE INTERNATIONAL BUREAU OF THE WORLD INTELLECTUAL PROPERTY ORGANIZATION

Mailing Address:

WIPO
34, chemin des Colombettes
1211 Geneva 20
Switzerland

Authorised Officer:

M. Abidine

PATENT COOPERATION TREATY
INTERNATIONAL PRELIMINARY EXAMINATION REPORT

REC'D 10 APR 1992

PCT

IDENTIFICATION OF THE INTERNATIONAL APPLICATION		Applicant's or Agent's File Reference JD/MDW/5096																							
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According to International Patent Classification (IPC) or to both National Classification and IPC F16L 55/16; F16L 55/165		
REASONED STATEMENT AS TO CLAIMS MEETING CRITERIA OF NOVELTY (N), INVENTIVE STEP (IS) AND INDUSTRIAL APPLICABILITY (IA), AND CITATIONS AND EXPLANATIONS SUPPORTING SUCH STATEMENT		
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Kind of Non-Written Disclosure	Date of Written Disclosure referring to the Non-Written Disclosure	Date of Non-Written Disclosure	

CERTAIN PUBLISHED DOCUMENTS ¹⁰			
Application/Patent	Date of Publication	Filing Date	Priority Date (Valid Claim)

CERTAIN DEFECTS IN THE INTERNATIONAL APPLICATION ¹¹

The following defects in the form or contents of the international application have been noted.

The claims are not in two part form as required by Rule 6.3 (b).

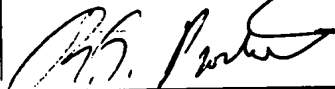
CERTAIN OBSERVATIONS ON THE INTERNATIONAL APPLICATION ¹²

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Reference numeral 90 on pages 7 and 5 does not seem to be shown on the drawings.

CERTIFICATION

Date Demand Submitted 13 NOVEMBER 1991 13.11.91	Date of Completion of the International Preliminary Examination Report 27 th March 1992 (27.3.92)
International Preliminary Examining Authority United Kingdom Patent Office	Signature of Authorized Officer  B J PROCTOR

- 1 -

IMPROVEMENTS RELATING TO THE LINING OF PIPELINES OR PASSAGEWAYS

This invention relates to the lining of pipelines or passageways, using flexible tubular materials which are impregnated with curable synthetic resin and which, when placed in position lining the pipeline or passageway are held by fluid pressure against the pipeline or passageway surface until the resin cures to a hard condition leaving a hard lining pipe lying on the pipeline or passageway surface.

The most widely practised method using such resin impregnated linings is disclosed in British Patent No. 1449455 from which it will be seen that the impregnated lining is applied to the pipeline or passageway surface by eversion of same into the pipeline or passageway, using fluid pressure.

The present invention is concerned with lining pipelines which are called "laterals" insofar as they enter sidewise a main pipeline or passageway, such as a main sewer. Of any particular main line, there may be a plurality of laterals entering the main line, and it frequently arises that the laterals have to be lined by means of a resin impregnated tube. Using existing methods for lining laterals, it is not possible to perform any lining operation of a second or subsequent lateral whilst the lining in one lateral is being cured. As the cure time may take up to 5 or 6 hours, if a section of main line having say 5 laterals to be lined is involved, the minimum total time to line all laterals will be in the order of 25 to 30 hours. As these lining operations are required to be carried out during the night for purposes of convenience, it is often the case that the completion of the work has to take place over

- 2 -

several evenings and therefore the work crew must depart the site and return at a later date to complete the work.

The present invention is concerned with providing an arrangement wherein the completion of a plurality of lateral lining operations may be effected in a much shorter period.

In accordance with the present invention, a plurality of laterals meeting a common main line are lined by inserting resin impregnated linings into said laterals and to hold same in position by fluid pressure whilst curing of the resin takes place, and after insertion of each lining, a seal arrangement at the location where the lateral meets the main line enables the second and subsequent laterals to be lined whilst the first or previously inserted lining is held in position and is being cured.

The seal arrangement may comprise a flexible bag which is pressurised with the medium which urges the lining against the lateral surface so as to prevent escape of the pressurising medium, but such bag allowing pressure fluid supplying pipes to pass to the inside or outside of the bag and to other lateral connections downstream of the bag in the main pipe whereby such other laterals may be lined by the eversion there into of a resin impregnated lining tube, the holding of the lining tube to the lateral surface by fluid pressure, and a sealing bag retaining the lining in position and forming a seal between the lateral and the main line.

It will be seen that by using the method, the linings for the laterals can be inserted sequentially, and held in installed position under pressure, and cured simultaneously. A plurality of laterals can be lined and cured in a total time equal to the time it takes to line

- 3 -

one lateral multiplied by the number of laterals plus the curing time for one of the lateral linings which total time in the case of 5 laterals may be in the order of 8 hours, which is a considerable reduction from the 25-30 hours which are required for the lining of 5 laterals by the conventional method. For example therefore the lateral lining on any particular contract may be capable of being completed in one evening as opposed to being completed in stages over two or three evenings.

Embodiments of the invention will now be described, by way of example, with reference to the accompanying diagrammatic drawings, wherein:-

Fig. 1 is a diagrammatic side elevation showing the method by which a lateral is lined in accordance with the method of the invention;

Fig. 2 is a sectional elevation taken on the line II-II;

Fig. 3 is an enlarged sectional view of the detail ringed III in Fig. 1;

Fig. 4 is an enlarged sectional view of the detail ringed IV in Fig. 1;

Fig. 5 is a sectional side view of an alternative form of apparatus for carrying out the method of the invention.

Fig. 6 is an end view of the arrangement shown in Fig. 5; and

Fig. 7 is a perspective view of the lining tube used in the method of Figs. 5 and 6.

Referring to the drawings, in Fig. 1 a main line 10 is intersected by a lateral 12 which is to be lined in

- 4 -

accordance with a first method of the invention.

For the lining operation, a resin impregnated flexible lining tube 14 has a beaded end 16 which is reinforced, and forms a ring which seats against the opening of the lateral 12. The tube 14 is loaded inside a carrier tube 18. Carrier tube 18 has one end 20 anchored to an elbow pipe 22, and to the other end of the elbow 22 is connected a containment tube 24. A disc 26 seals the other end of the containment tube, but extending through the disc is a pressure hose 28 and a bleed hose 30.

The pressure hose 28 and bleed hose 30 can slide through the disc 26 as insertion of the lining tube 14 takes place as will be explained.

If reference is made now to Fig, 4, as shown, the tail end of the carrier tube 18 is closed around the bleed hose 30, and the pressure hose 28 is connected to the closed end of the carrier tube 18. The end of the lining tube 14 stops short of the end of the carrier tube so that the lining tube can be left in position lining the lateral 12.

The method of insertion comprises the introduction of pressurising fluid, water or gas, through the pressure hose 28 into the space between the containment tube 24 and the carrier tube 18 with the result that the carrier tube 18 and the lining tube 14 are everted as shown at 32 in Fig. 1 into the lateral 12, the lining tube 14 being presented to the lateral surface. The assembly of tubes 14 and 18 therefore everts into the lateral 12 and the pressure hose 28 and the bleed hose 30 are pulled through the containment tube, through the elbow 22 and up to the top end of the lateral. The portion 30A of the bleed hose projects out of the end of the eversion face so that if any water collects above the lining, it can bleed

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through end 30A, which is provided with apertures 34 for this purpose, out of the tube 30 and back to drain so that there will be no undesirable collection of liquid in the lateral whilst lining is taking place.

The pressure fluid which is supplied by the hose 28 leaks through an aperture 36 in the elbow 22 and pressurises a bag or bladder 38 surrounding the elbow as shown. The bladder is therefore inflated so as to seal against the main line 10 and to seal the end 16 of the lining. The aperture is provided with or acts as a pressure reduction means so that whilst the everting pressure may be of the order of 20 p.s.i., the pressure in the bag or bladder 38 is much lower e.g. in the order of 5 p.s.i. The bladder 38 remains pressurised as long as the pressure is maintained inside the everted lining and carrier tube. As soon as this position has been reached, a towing assembly 40 which is used for positioning the elbow 22 by being connected thereto through a link 42 fast with elbow 22, is released from that link insofar as, as shown in Fig. 3, the link 42 has a socket 44 in which engages a centralising pin 46. The wall of the socket 44 has aligned apertures 48, 50 in which pegs 52 and 54 engage, these pegs being carried by pivotable jaws 56 and 58. The jaws 56 and 58 are connected to the clamping device 60 having swingable arms 62 and 64 on the ends of which are provided guide rollers 66 and 68. As the bladder 38 inflates, the rollers 66 which are held inwardly by spring action are caused to pivot to the position shown in Fig. 1 which has the effect of moving the jaws 56 and 58 apart to remove the pegs 52 and 54 from the apertures 48 and 50 and the positioning device 40 and the device 60 with the rollers and jaws can be detached from the bladder and the connecting tube 42 so that it can be pulled along the line 10 away from the inflated bladder.

A series of additional pressure pipes and corresponding

- 6 -

bleed pipes 70, 72 (four in all) extend to the outside of the bladder 38 and are removably attached to the positioning device 40. Device 40 is moved to the other end of the main line 10 and a second assembly comprising elbow 22, bladder 38, containment tube 24, sealing disc 26 and the carrier tube and lining 18 and 14 with bladder 38 is connected to the positioning device (and one of the additional pressure/bleed pipe pair) which is again moved back into the main line 10 until the next lateral to be lined is reached when the device is placed in register therewith so that by appropriate pressurising of the assembly as described in relation to Fig. 1, the lining tube can be inserted into position in the lateral. When this process has been completed, the procedure is again repeated so that all five laterals can have lining tubes placed therein and the lining tubes can be cured simultaneously.

To effect the curing, it may be necessary to circulate hot water, steam or hot air through the pressurising hoses 28, 70 and 72 if the resin is of the heat cure type.

When curing has been completed, it is simply a matter of releasing the pressure in each of the bladders 38 which will then collapse, and each can be removed from the main line 10 by pulling on the pressure hose 28, 70 or 72 as the case may be. The retraction of such hose retracts the carrier tube 18 from inside the lateral, leaving the rigid lining tube 14 in position.

In the alternative arrangement shown in Figs. 5, 6 and 7, the method of operation is the same as that described in relation to Figs. 1-4, and only the structure of the bladder is varied in order to make it easier for the additional pressure/bleed pipes to pass the bladder assembly whilst it is inflated.

- 7 -

Thus, the bladder is in the form of diametrically opposite inflatable pillows 80, 82 which are carried on inner diametrically opposite plates, 84, 86 connected to the elbow 22 by being bolted thereto by bolts 88. Plate 86 is carried by the elbow 22 on a radial leg 90 which is adjustable in length so that the arrangement can be adjusted to suit pipes of different diameters. Pillow 80 has a hole, 92 therein through which the elbow pipe 22 passes the pipe 94 which extends from the elbow 22 forms passage for the everting medium and also carries the coupling 42. Pipes 96, 98 connect the interior of the pipe 94 and the pillows 80, 82. The aperture 36 is also shown in Fig. 5. The operation of the arrangement of Figs. 5, 6 and 7 will be understood from the previous description of the embodiment of Figs 1-4. The lining 14 and the carrier tube 18 are inverted by pressurising the interior of elbow 22 and at the same time by passage of the pressurising medium through hole 36, pipe 94, and pipes 96, 98 inflation of the pillows 80, 82 to seal the lateral aperture whilst eversion takes place. The additional pressure/bleed pipes 70, 72 can pass between the pillows easily as shown in Fig. 6 in dotted lines. Whilst pillow 80 seals the lateral, pillow 82 forms a reaction means.

The lining tube 14 in the Fig. 7 arrangement as shown has a collar 100 which is preferably a sealed envelope containing a resin absorbent material which is impregnated with curable synthetic resin similar to the tube itself. As the lining tube 14 cures so the collar will also cure and the collar remains in place around the lateral aperture.

The present invention provides a system whereby a plurality of lateral linings may be cured simultaneously thereby reducing the overall cure time in a contract where a number of laterals have to be lined.

CLAIMS

1. A method of lining a lateral pipe leading into a main pipe, wherein a resin impregnated lining is inserted into the lateral pipe using a fluid medium under pressure, and wherein a seal arrangement forms a seal at the location where the lateral meets the main pipe as curing of the resin takes place.
2. A method according to Claim 1, wherein the seal is formed by an inflatable means, said means being inflated by the fluid medium used for inserting the lateral lining, but at a lower pressure.
3. A method according to Claim 1 or 2, wherein the fluid medium is supplied to insert the lateral lining by means of a pressure pipe, and at least one additional pressure pipe extends past the seal arrangement so that pressure fluid can be applied to another lateral lining remote from the first mentioned lateral whilst curing of the first mentioned lateral lining is taking place.
4. A method according to Claim 1, 2 or 3, wherein the seal arrangement comprises an elbow pipe through which the lateral lining is everted to be inserted into the lateral, and the seal arrangement is connected to the elbow.
5. A method according to Claim 4 when taken with Claim 2, wherein the inflatable means comprises a bag or bladder which is inflated against the main pipe surface.
6. A method according to Claim 5, wherein the bag or bladder is in the form of a pair of spaced diametrically opposed inflatable pillows.

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7. A method according to any preceding claim wherein the lining tube is provided with a collar which is applied to the location at which the lateral meets the main pipe, and the lining is of finite length and is open ended.
8. Apparatus for inserting a resin impregnated lining into a lateral pipe which leads to a main pipe, comprising an elbow pipe by which the lining may be inverted using fluid medium under pressure into the lateral from the main pipe, said elbow having connected thereto an inflatable sealing arrangement whereby the elbow may be locked in position in the main pipe by means of said fluid medium, and so that a pressure pipe may extend along the main pipe past the sealing arrangement so that a further lining may be inserted into a further lateral whilst the sealing arrangement holds the elbow in position in the main pipe and the resin impregnated first mentioned lining cures.

1-2

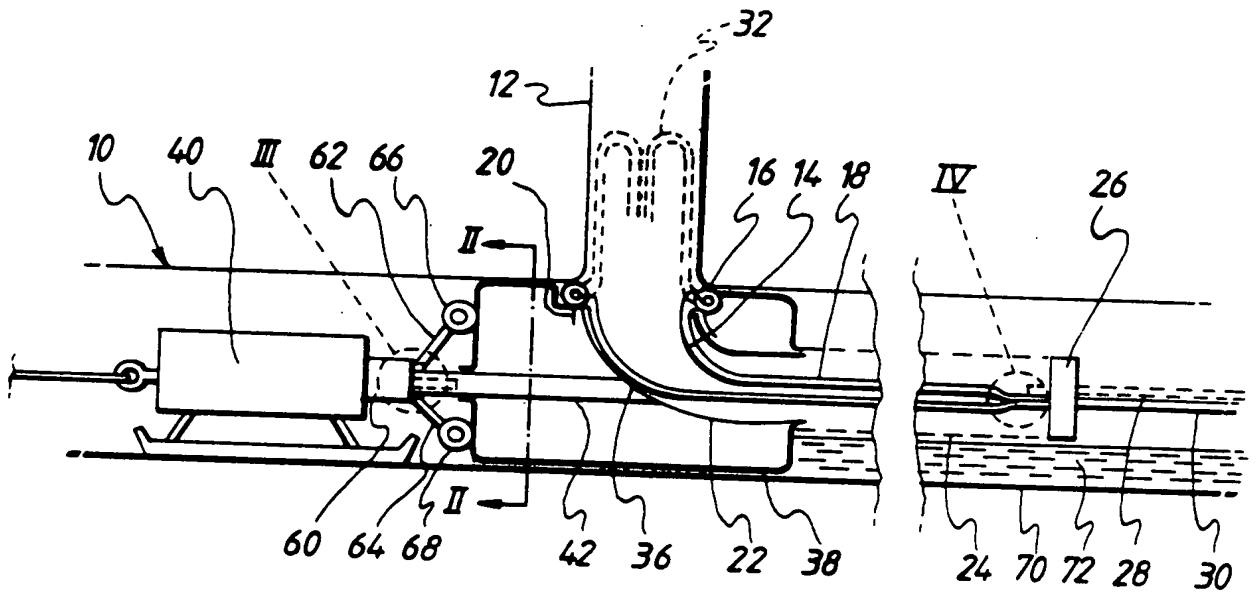


FIG. 1

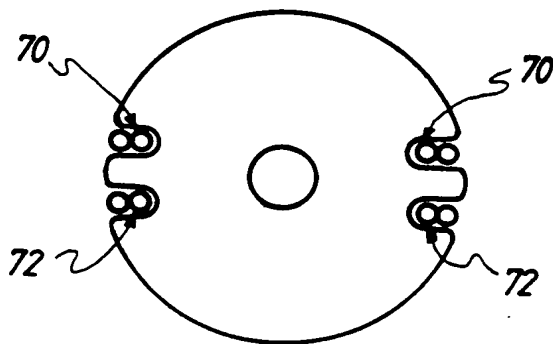


FIG. 2

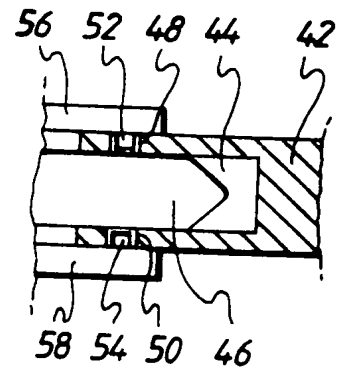


FIG. 3

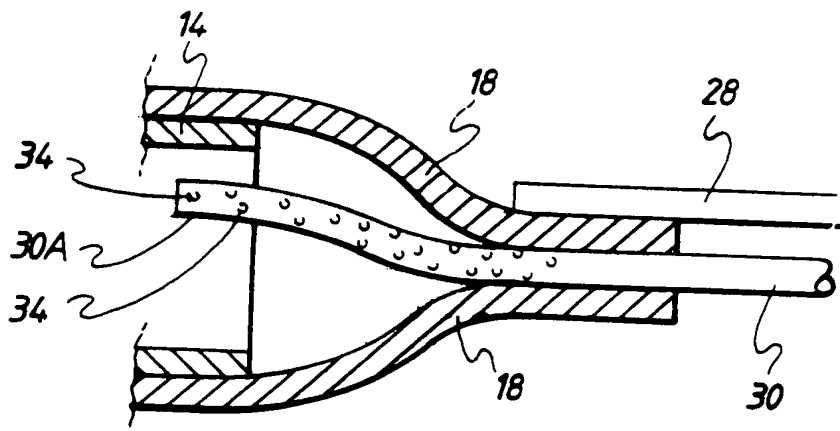


FIG. 4

2-2

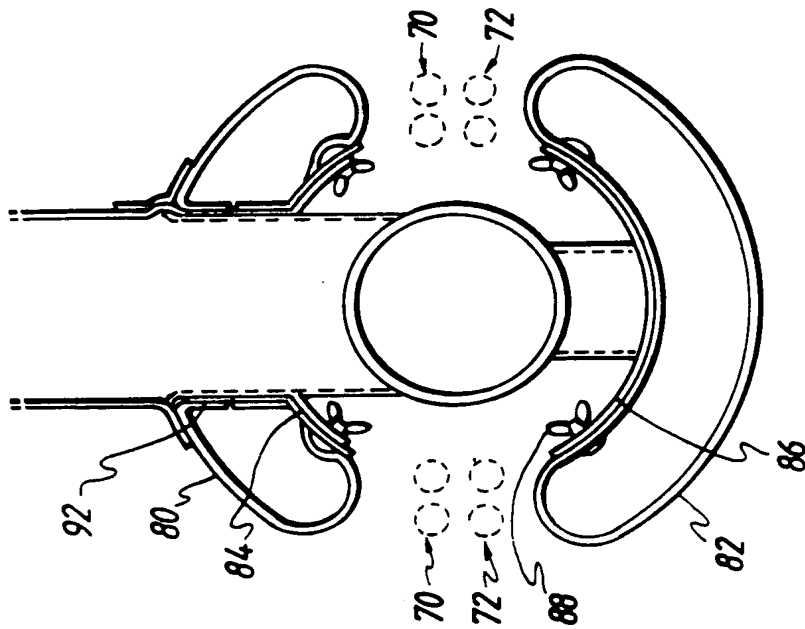


FIG. 6

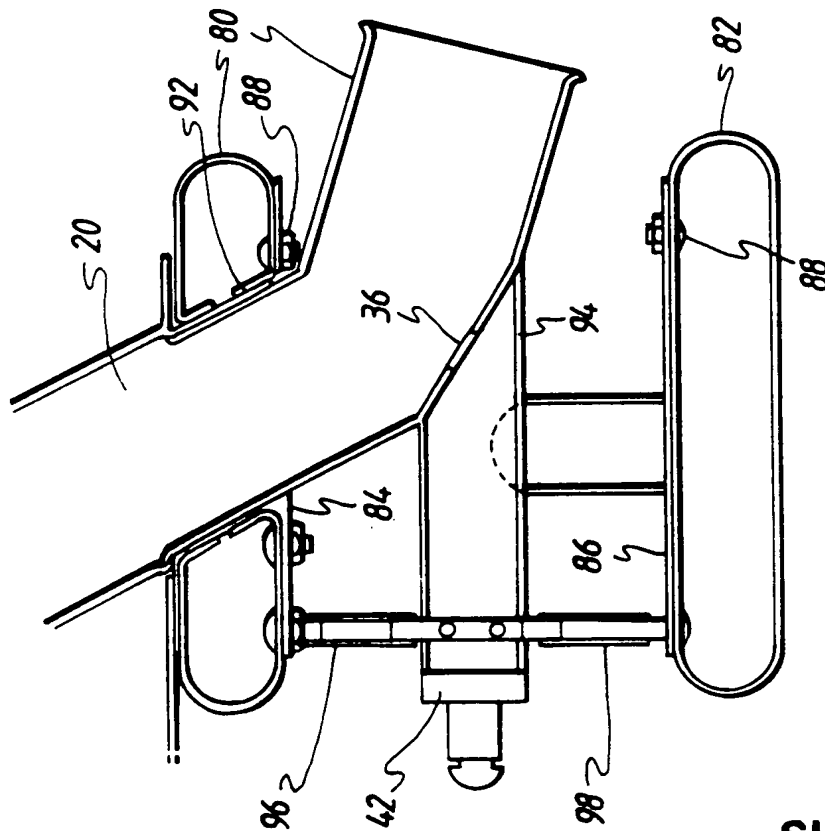


FIG. 5

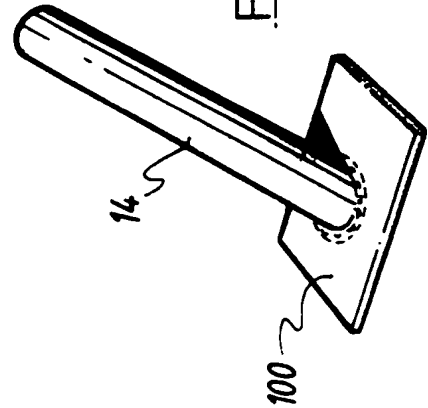


FIG. 7

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 9100628

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all)⁶

According to International Patent Classification (IPC) or to both National Classification and IPC
 F 16 L 55/16 F 16 L 55/165

II. FIELDS SEARCHED

Minimum Documentation Searched⁷

Classification System

Classification Symbols

Int.Cl.5

F 16 L

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched⁸

III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹

Category ¹⁰	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³
A	WO-A-8 908 218 (NCC BYGG AB) 8th September 1989, see figures 1,2; claims 1,3 ---	1,2,7,8
A	EP-A-0 241 719 (INSITUFORM GROUP LTD) 21st October 1987, see claims 1,7 ---	1
A	GB-A-2 082 285 (INSITUFORM LTD) 3rd March 1982, see figure 1 ---	1
A	WO-A-8 503 758 (RUMP) 29th August 1985 -----	4-6,8

¹⁰ Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search

02-07-1991


Date of Mailing of this International Search Report

17.09.91

International Searching Authority

EUROPEAN PATENT OFFICE

Signature of Authorized Officer

 Danielle van der Haas

**ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO.**

GB 9100628

SA 46788

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 06/09/91
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO-A- 8908218	08-09-89	SE-B- 460496 SE-A- 8800653	16-10-89 26-08-89
EP-A- 0241719	21-10-87	CA-A- 1271115 JP-A- 63067135 US-A- 4778553	03-07-90 25-03-88 18-10-88
GB-A- 2082285	03-03-82	None	
WO-A- 8503758	29-08-85	EP-A- 0173702	12-03-86

PLEASE REPLY TO: 5 YORK PLACE, LEEDS LS1 2SD.

Our Ref: JD/MAW/DJM/5096

20th March, 1992

The Comptroller,
International Section,
The Patent Office,
Cardiff Road,
Newport,
GWENT NP9 1RH.

Dear Sirs

Re: PCT International Application No. PCT/GB91/00628
Filing Date: 22nd April, 1992
Applicant: Insituform Group Limited

In connection with the above case, and in response to the outstanding First Examination Report, the Claims have been amended to deal with the Examiners objection on the basis of the prior art, and new Claims in triplicate are enclosed. Page 2 has also been amended and a fresh page 2 in triplicate is enclosed. It is believed that these new pages will meet the Examiners requirements.

Yours faithfully,
J. DENMARK

several evenings and therefore the work crew must depart the site and return at a later date to complete the work.

The present invention is concerned with providing an arrangement wherein the completion of a plurality of lateral lining operations may be effected in a much shorter period.

In accordance with the present invention, a plurality of laterals meeting a common main line are lined by inserting resin impregnated linings into said laterals and to hold same in position by fluid pressure whilst curing of the resin takes place, and after insertion of each lining, a seal arrangement at the location where the lateral meets the main line enables the second and subsequent laterals to be lined whilst the first or previously inserted lining is held in position and is being cured.

The seal arrangement may comprise a flexible bag which is pressurised with the medium which urges the lining against the lateral surface so as to prevent escape of the pressurising medium, but such bag allowing pressure fluid supplying pipes to pass to the inside or outside of the bag and to other lateral connections downstream of the bag in the main pipe whereby such other laterals may be lined by the eversion there into of a resin impregnated lining tube, the holding of the lining tube to the lateral surface being accepted by fluid pressure, and a sealing bag retaining the lining in position and forming a seal between the lateral and the main line.

It will be seen that by using the method, the linings for the laterals can be inserted sequentially, and held in installed position under pressure, and cured simultaneously. A plurality of laterals can be lined and cured in a total time equal to the time it takes to line

CLAIMS

1. A method of lining a lateral pipe leading into a main pipe, wherein a resin impregnated lining is inserted into the lateral pipe using a fluid medium under pressure, and wherein a seal arrangement forms a seal at the location where the lateral meets the main pipe as curing of the resin takes place, and wherein the fluid medium is supplied to insert the lateral lining by means of a pressure pipe, and at least one additional pressure pipe extends past the seal arrangement so that pressure fluid can be applied to another lateral lining remote from the first mentioned lateral whilst curing of the first mentioned lateral lining is taking place.
2. A method according to Claim 1, wherein the seal is formed by an inflatable means, said means being inflated by the fluid medium used for inserting the lateral lining, but at a lower pressure.
3. A method according to Claim 1 or 2, wherein the seal arrangement comprises an elbow pipe through which the lateral lining is everted to be inserted into the lateral, and the seal arrangement is connected to the elbow.
4. A method according to Claim 3, when taken with Claim 2, wherein the inflatable means comprises a bag or bladder which is inflated against the main pipe surface.
5. A method according to Claim 4, wherein the bag or bladder is in the form of a pair of spaced diametrically opposed inflatable pillows.

6. A method according to any preceding claim wherein the lining tube is provided with a collar which is applied to the location at which the lateral meets the main pipe, and the lining is of finite length and is open ended.
7. Apparatus for inserting a resin impregnated lining into a lateral pipe which leads to a main pipe, comprising an elbow pipe by which the lining may be inverted using fluid medium under pressure into the lateral from the main pipe, said elbow having connected thereto an inflatable sealing arrangement whereby the elbow may be locked in position in the main pipe by means of said fluid medium, and so that a pressure pipe may extend along the main pipe past the sealing arrangement so that a further lining may be inserted into a further lateral whilst the sealing arrangement holds the elbow in position in the main pipe and the resin impregnated first mentioned lining cures.